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Industry Partners' Insights September 2019

NanoFASE benefitted from the collaboration of a range of industry partners and advisors, who supplied particles for the empirical work, developed advanced techniques and instruments that going forward will serve Europe and other regions, pilot-tested nano-enabled applications in controlled experiments to help refine our models, and/or participated in road-testing the models.

Three short interviews highlight different facets of the NanoFASE experience for some of these valued partners.

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Promethean Particles design, develop and manufacture bespoke inorganic nanoparticle dispersions: providing these in liquid phase obviates inhalation risk and controls aggregation. They supplied bare and PVP-capped particles (CeO_2, Fe_2O_3 and Fe_3O_4, TiO_2, and CuO) for NanoFASE experiments on fate and behaviour of nanomaterials in aquatic and soil compartments.

Promethean's Dr. Selina Ambrose stated that '*manufacturers of nanoparticles have a responsibility to understand how they are transformed in the course of their life cycle and how they may affect (if at all) the environment.*

The information gained from NanoFASE is useful in customer dialogue: "We are proactive – These are the steps we are taking to understand what actually happens with our particles in the environment, and hopefully you can pass that information on".

'It reflects well on our clients too – some of them big multinational companies. There is normal societal pressure on them to ensure nanosafety. If this awareness and responsibility feeds on further up the supply chain it can only be a benefit.'

Dr. Ambrose judged *'It's good that the algorithms are there in the NanoFASE Clickable Framework for modellers, and for those who understand them to identify how the conclusions are derived. In my own professional role, I want to get an idea of what's happening in each environmental compartment, for specific materials or material groups. Or when speaking with a customer who is interested more specifically in how a certain material or product type would affect a certain compartment, this Clickable Framework presentation could be a very useful tool to illustrate what has been done within the project.'*

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Malvern Panalytical is a leading provider of scientific instrumentation for the measurement of elemental concentrations, crystallographic structure, molecular structure, remote sensing, rheology, particle size, particle shape, particle concentration and more.

According to Dr. Phil Vincent, **within NanoFASE Malvern Panalytical developed a new off-the-shelf NanoSight Sample Assistant,** integrating of the autosampler with flexible experimental design functions and data processing.
Technical decisions were guided through discussions and project goals of the NanoFASE consortium: 'What samples are regularly used? what information is important about the sample? and how could we improve the process or address any pains?'.

The final instrument was tested against a so-called 'worse-case scenario' sample - powder dispersions of nZVI (from TUL) in a time-resolved case study.

'Interaction with consortium partners has informed our understanding of what's important to the academic research community in sample measurement of nanomaterial. This is focused on not just solving a problem in standard sample measurements but also digging into the goal of the measurement and identifying how as a company we can provide insight (e.g. moving away from a single sample measurement at a set timepoint in deionised water to time-resolved measurements of sample behaviour across relevant periods in a range of environmentally relevant media - supporting these measurements requires additional techniques).'

'We now see this capability as a significant advancement on the information we provide to the research community. We believe Malvern Panalytical can now give a fuller picture of the properties, fate & behaviour of nanomaterial.'

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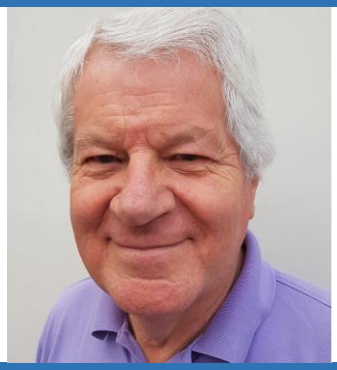
Professor Barry Park (GBP Consulting Ltd) is a Chartered Chemist with long experience in both public and private advisory service and in developing commercially viable nano-enabled products. He was Chief Operating Officer at Oxonica plc, overseeing quality, intellectual property and regulatory affairs while his product development programmes led to commercialisation of the **widely used sunscreen component *OptisolTM* and *EnviroxTM*, a fuel borne nanocrystalline catalyst.**

The role of Professor Park has been to support the development of an industry and exploitation focus within NanoFASE and he has acted as the exploitation advisor to the project. This has meant ensuring that the work benefits from the input of its industry partners and that industry benefits from the work done in the project. He has often raised a critical voice calling for increased realism within the NanoFASE exposure models. He contributed to road-testing the models and producing an industry-centred guidance document that will be available in Autumn 2019.



Professor Park noted that the outcome of NanoFASE has been *'complex spatio-temporal models showing where released particles would go over time, along with associated test protocols, databases and knowledge whose application is directly relevant to the work of regulatory stakeholders and academics. Industry applications of NanoFASE findings and results would be performed in most cases by safety assessment professionals, in the context of preparing product safety dossiers or looking for the finely detailed outcomes of a tiered exposure assessment.'*

"NanoFASE's development of second- and third-tier modelling is part of a real-world safety assessment continuum ruled by the need to generate appropriate and high-quality data for ensuring best practice at industry level."

' NanoFASE has provided reports from industry contexts showing where and how releases could potentially take place across the nanomaterial life cycle, illustrating which environmental compartments ought to be the focus to determine the models' quantification of exposure.'